



WEEK 4: UNIVERSITY OF OXFORD
2-6 September 2019

Welcome to Oxford!

Workshop registration: Registration for the APTS week will take place between 11:30–13:00 on Monday 2 September 2019 in the Ground floor social area, Department of Statistics (see Figure 1). A map showing key locations for the week can be found on page 5 of this booklet.



Figure 1: Department of Statistic (left) and Balliol College (right).

You will receive your name badge from the registration desk. Please wear your badge at all times. This will help with security and also help you identify fellow participants.

Check-in / Luggage: Check-in for residential delegates is from 12:00 (noon) at the Lodge, Balliol College (see Figure 1) on Monday 2 September. Check-out is by 10 am on Friday 6 September. A room will be available at the Department of Statistics to store your luggage until lunchtime.

IT: You are encouraged, if possible, to bring a laptop with R installed for taking part in the Flexible Regression and Design of Experiments & Studies lab sessions. See notes on pages 9 and 10 for further details. There will also be a computer lab with 50 desktop computers available for the practical sessions.

Wi-fi: We strongly advise that you set up Eduroam beforehand using <https://cat.eduroam.org/>. Alternatively, OWL accounts (a central wireless service for both University Members and Visitors) will be available at registration but please note you will need more than one OWL account if you plan to use multiple devices simultaneously.

There will also be wifi provision for residential students staying at Balliol College. Wifi is available in the bedrooms via the OWL network and you will be given your code when you check-in.

Your room: Residential participants have rooms booked at Balliol College, Broad Street, Oxford OX1 3BJ. **Unfortunately there is no parking available at the College (if you have special requirements then please contact the local organizer)** however the Pear Tree and Water Eaton Park and rides are very convenient as the buses stop near the College: http://www.oxford.gov.uk/PageRender/decTS/Park_and_Ride_occw.htm. The College is a 15 minute walk from the railway station (taxis are available outside Oxford train station) and a 10 minute walk from the bus and coach station at Gloucester Green.

All residential delegates have been booked single room accommodation at Balliol College for 4 nights from Monday 2 September until Friday 6 September inclusive. Check-in is from 12:00 pm on Monday 2 September at the Lodge. Check-out is by 10:00 am on Friday 6 September.

The Porter will give you a bedroom key and a code number to open the door to your staircase. All rooms have washbasins. Linen and bedding is provided and tea and coffee making facilities are in all the rooms.

Breakfast will be served in the Grand Hall, Broad Street, between 8:00 am and 9:15 am. You will have the option of a full English breakfast.

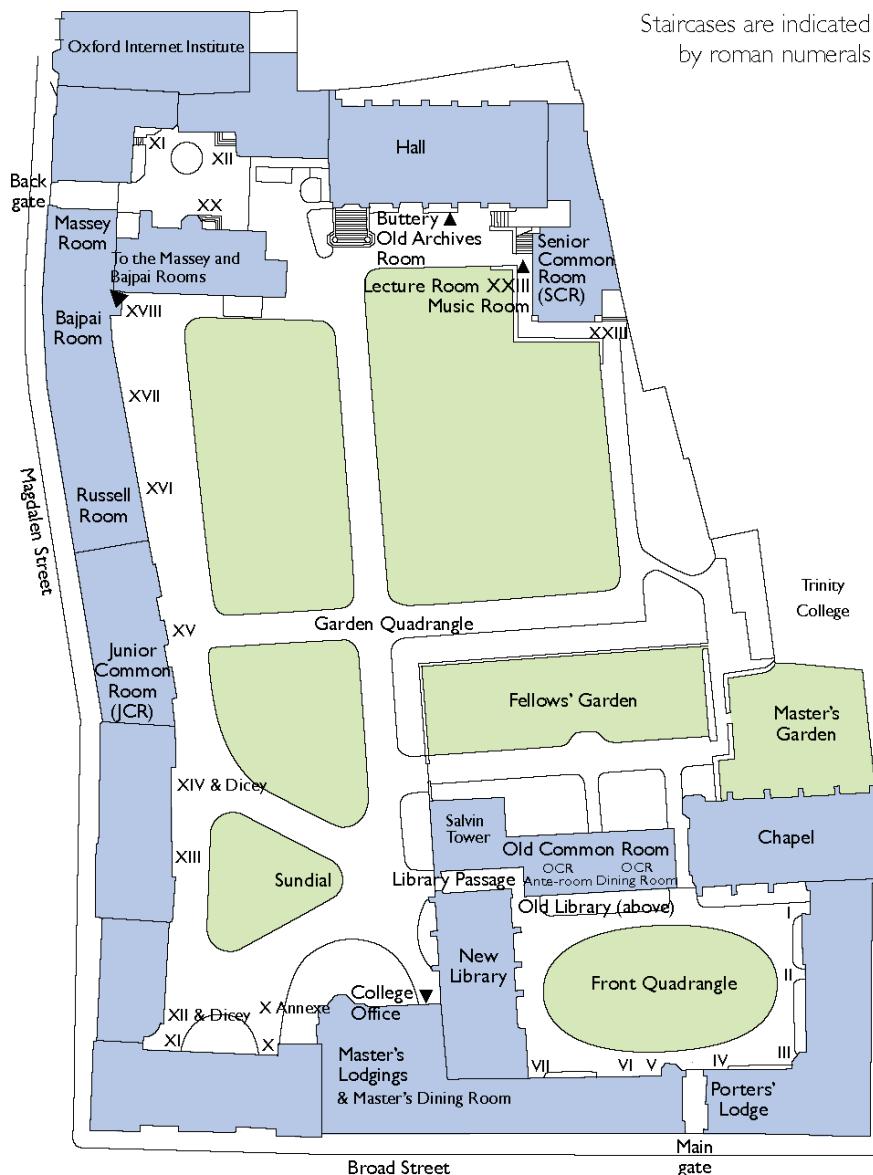
Balliol operates a non-smoking policy in all buildings and enclosed areas including outside entrances to buildings. Smoking is permitted in the Quads please use the outside receptacles provided.

Meals: All meals, with the exception of the Academy Dinner and the BBQ, will take place in the main Dining Hall of Balliol College. Breakfast will be served from 08:00–09:15, lunch from 13:00–14:00 and dinner from 18:30–19:30 on Monday and Wednesday. There will be a BBQ at the Cherwell Boathouse on Tuesday. The Academy Dinner will be held at Exeter College at 19:30.

Have a great week!

Useful Maps

BALLIOL COLLEGE Oxford OX1 3BJ

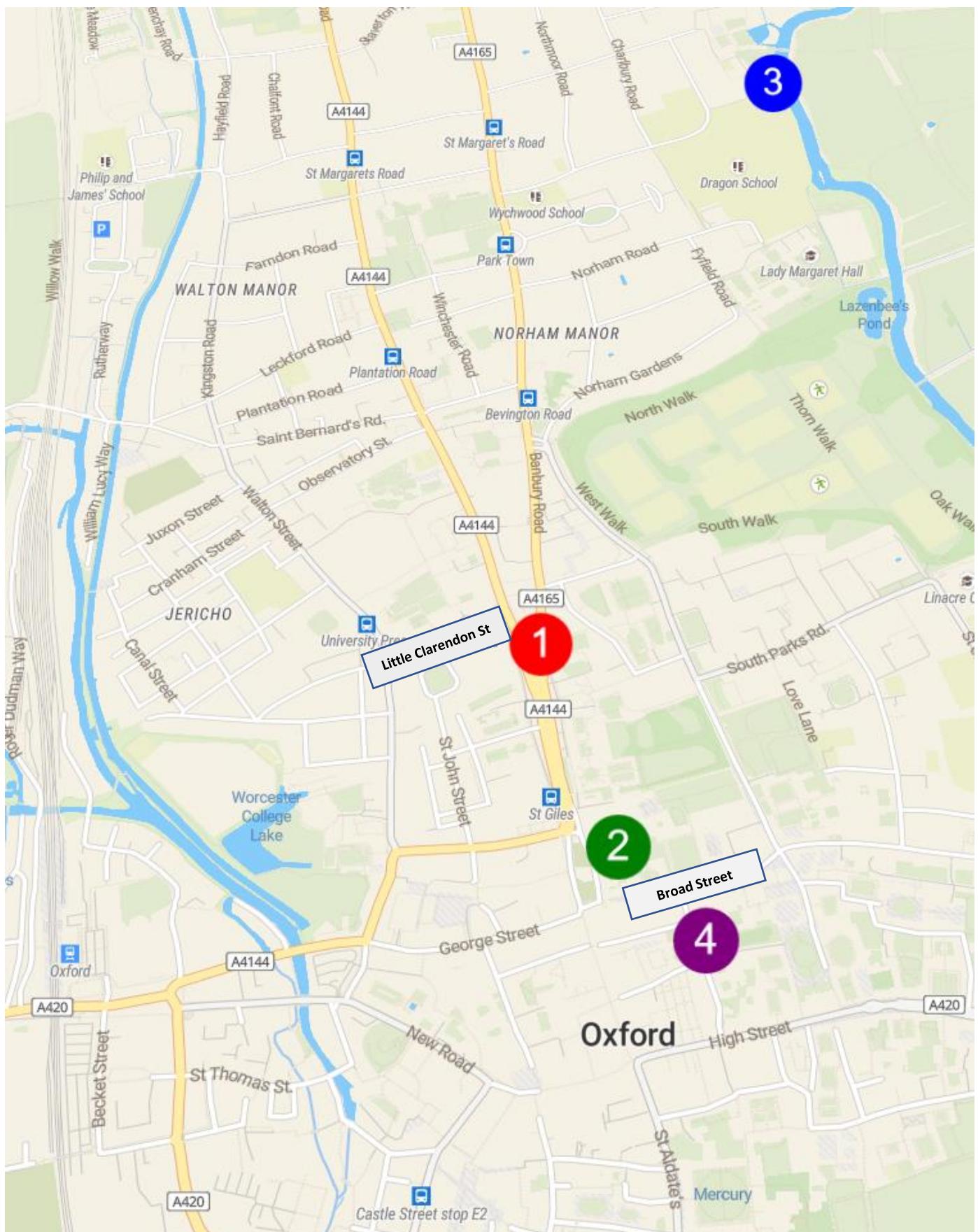


For disabled access, please see www.balliol.ox.ac.uk/disability

For a map of Oxford, other colleges and the University buildings,
please see www.ox.ac.uk/visitors/map



KEY LOCATIONS FOR APTS OXFORD



- 1 DEPARTMENT OF STATISTICS, 24-29 ST GILES', OXFORD OX1 3LB
- 2 BALLIOL COLLEGE, BROAD STREET, OXFORD, OX1 3BJ
- 3 CHERWELL BOATHOUSE, BARDWELL ROAD, OXFORD, OX2 6ST
- 4 EXETER COLLEGE, TURL STREET, OXFORD OX1 3DP

APTS Timetable

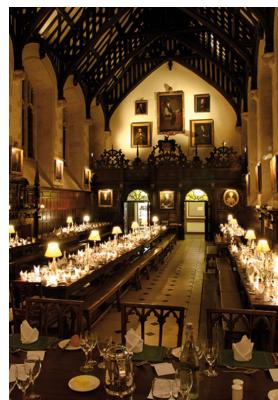
	Monday 2nd September	Tuesday 3rd September	Wednesday 4th September	Thursday 5th September	Friday 6th September	
08:00 – 09:15		Breakfast				
09:30 – 11:00		Flexible regression (Lab)	Flexible regression	Flexible regression (Lab)	Design of experiments & studies	
11:00 – 11:30		Tea & Coffee Break				
11:30 – 13:00	Registration	Flexible regression	Design of experiments & studies (Lab)	Flexible regression	Design of experiments & studies (Lab)	
13:00 – 14:00	Lunch					
14:00 – 15:30	Flexible regression	Design of experiments & studies	Free afternoon	Design of experiments & studies		
15:30 – 16:00	Tea & Coffee Break			Tea & Coffee		
16:00 – 17:30	Flexible regression	Design of experiments & studies		Design of experiments & studies		
17:30 – 18:30	Free Time	Punting followed by BBQ at the Cherwell Boathouse 18:00 – 22:00		Free Time		
18:30 – 19:30	Dinner	Dinner				
Evening	Free Evening	Free Evening	Academy Dinner at Exeter College 19.30			

Local information

Location of lectures: All APTS lectures will take place in the Large Lecture Theatre (LG.01) at the Department of Statistics (http://www.stats.ox.ac.uk/contact_us/how_to_get_to_the_department), 24–29 St Giles', Oxford OX1 3LB. The practical sessions will take place in the Large Lecture Theatre (LG.01), IT Teaching Suite (LG.02) and Small Lecture room (LG.03) at the Department of Statistics.

Tea and coffee breaks: Refreshments will be served in the ground floor social area at the Department of Statistics.

Evening events: Tuesday evening will start with punting on the River Cherwell followed by a BBQ meal at the Cherwell Boathouse. Please arrive at 6.00 pm at the Cherwell Boathouse. You will be divided into groups of 6 for each punt. The following link is helpful to introduce the art of punting: <http://cherwellboathouse.co.uk/punting/how-to-punt/>



The Academy Dinner will take place at Exeter College at 7.30 pm on Thursday 5th September. Dress code: Smart casual. Exeter College, Turl Street, Oxford OX1 3DP, is just a two minute walk from Balliol College.

Sports facilities: Oxford University Sport offer a day pass structure for non-members for the Pulse/Powerlifting gyms. They also have a number of fitness classes available for non-members. For further details see <http://www.sport.ox.ac.uk/membership/membership/> and <http://www.sport.ox.ac.uk/membership/classes/>. The Sports centre is located on Iffley Road, OX4 1EQ approx. 25 minutes' walk from Balliol College.

Things to do in Oxford: Oxford is a beautiful and historic city with many local attractions. Some suggestions on activities of interest are given below:

University of Oxford Colleges Oxford University is the oldest University in the English speaking world. Countless famous figures and great minds have studied here and you may wish to explore some of the colleges that they were a part of. There are 38 independent colleges, many of whom open their doors to visitors at least a few hours every day. Many are free to visit, but some charge a small fee. Further details can be found at the link below: <https://www.ox.ac.uk/visitors/visiting-oxford/visiting-the-colleges>.

Museums, Libraries and places of interest Oxford has a wealth of museums such as the Ashmolean Museum and the Oxford University Museum of Natural History, places of interest such as the Sheldonian Theatre as well as many tranquil areas to get away from the hustle and bustle, such as Christ Church Meadow and University Parks. For further details please see the link below: <http://www.ox.ac.uk/visitors/visiting-oxford/visiting-museums-libraries-places>.

TV & Film Locations Oxford is a great favourite of the film industry and has been featured as the backdrop for many TV series and films such as Inspector Morse and Harry Potter. Further details can be found at: <http://experienceoxfordshire.org/see-and-do/tv-and-film-location.aspx>.

Other places of interest There are many neighbouring tourist attractions that are easily accessible from Oxford such as Blenheim Palace and Bicester Village. For further details please see: <http://experienceoxfordshire.org/see-and-do/top-10.aspx>.

Emergency details

In Office Hours

Medical Assistance: Please speak to Reception at the Department of Statistics if you need any medical assistance.

Messages: The telephone number for colleagues or family to leave an urgent message for you during office hours is +44 (0)1865 272860 or +44 (0)1865 281536.

Fire Procedures: The fire alarm is tested weekly, usually on Friday mornings around 9:00 am. There is no need to evacuate the building then. If the fire alarm is sounded at any other time, you must evacuate the building. If you discover a fire, set the fire alarm off using the nearest red fire call point.

In the event of the fire alarm sounding, evacuate the building safely and quickly. Do not use the lift. The assembly point is outside the Department of Physics, just across Keble Road.

Full details of safety procedures will be provided at registration.

Out of Office Hours

Medical Assistance: Contact the Duty Porter of Balliol College at the Lodge or telephone +44 (0)1865 277777. If no reply is received, the porter may be on a security patrol. Ring for an ambulance on 999 or 112 asking them to come to the main college entrance on Broad Street. Having made the call, go to the main entrance yourself reporting the emergency to the Porter on duty and wait for the ambulance to arrive.

Messages: The Lodge, Broad Street, is open 24 hours and the Duty Porter will be glad to assist with all your queries. The Lodge can be contacted on +44 (0)1865 277777 or porter@balliol.ox.ac.uk

Fire Procedures: Upon check-in at Balliol College, you will be given an information sheet giving details of emergency procedures.

Module details

Flexible Regression

MODULE LEADERS: C. MILLER & T. NEOCLEOUS

Aims: The term “flexible regression” refers to a wide range of methods which provide flexibility in the nature of the relationship being modelled. The course will start with univariate smoothing and progress through standard forms of nonparametric regression to state-of-the art modelling tools which can be applied in a wide variety of settings. The course will cover the main ideas from a conceptual perspective as well as investigating aspects of the underlying theory and computation. There will also be some exploration of practical use of the methods in real applications.

Learning outcomes: By the end of the module, students will be able to:

- describe and explain the techniques of nonparametric regression including smoothing and quantile regression approaches;
- describe the issues of bias and variance associated with model fitting and selection;
- state and describe a range of mechanisms which can be used to smooth data;
- explain how these techniques can be incorporated into wider modelling tools;
- use these methods in a wide range of applications.

Prerequisites: Linear models and generalised linear models (preliminary APTS material and Statistical Modelling); R programming (preliminary APTS material and Statistical Computing); matrix computations (Statistical Computing); confidence intervals and hypothesis tests (Statistical Inference).

Further reading:

- Koenker, R. (2005). Quantile Regression (Econometric Society Monographs). Cambridge: Cambridge University Press. <https://doi.org/10.1017/CBO9780511754098>
- Wood, S.N. (2017) Generalized Additive Models: An Introduction with R (2nd edition). Chapman and Hall/CRC.

Topics:

1. spline, basis and kernel approaches to nonparametric regression;
2. quantile regression;
3. computational issues and an insight into asymptotic properties;
4. generalised additive models (including quantile regression extensions);
5. alternative approaches, including eg functional data analysis and Gaussian processes;
6. case studies.

Practical labs: For the practical labs, the following R packages are required: `gamlss`, `ggplot2`, `mgcv`, `quantreg`, `rpanel`, `splines`.

Assessment: A set of exercises assigned by the module leaders, including a data-analysis exercise involving practical use of some of the methods covered.

Design of Experiments and Studies

MODULE LEADER: D. WOODS

Aims: To introduce the fundamental principles of statistically designed experiments, and other modes of data collection, and highlight their important role in the scientific method. A variety of classical and modern methods will be overviewed, connections between them emphasised, and ongoing research challenges introduced.

Learning outcomes: An understanding of the major different mechanisms for data collection, their similarities and differences. For designed experiments, an appreciation of the impact of the choice of design on the precision and accuracy of the subsequent statistical modelling and inference. An awareness of the challenges presented to data collection methodologies from modern scientific experiments and studies. Familiarity with some of the practical issues in implementing statistically designed experiments.

Prerequisites: Linear and nonlinear/generalised linear modelling. Sampling distributions of parameter estimators, including basic asymptotic results. An understanding of the fundamentals of Bayesian inference. Basic statistical computing, including simple optimisation methods. All these topics, and more, are covered by the APTS Statistical Inference, Statistical Computing and Statistical Modelling modules.

Further reading:

- Morris, M.D. (2011). Design of Experiments: an Introduction based on Linear Models. CRC Press.
- Wu, C.F.J. and Hamada, M.S. (2009). Experiments: Planning, Analysis and Optimization (2nd ed.). Wiley.
- Atkinson, A.C., Donev, A.N. and Tobias, R.D. (2007). Optimum Experimental Design, with SAS (2nd ed.). OUP.

Topics:

1. Modes of data collection, experiments and causality, the impact of design on modelling
2. Factorial experiments
3. Bayesian design, and design for nonlinear models
4. Design of computer and simulation experiments
5. Data collection in spatial studies and via sample surveys, and connections to design of experiments

Practical labs: For the practical labs, the following R packages are required: `devtools`, `igraph`, `effects`, `FrF2`, `fields`, `acebayes`, `DiceKriging`, `akima` , `DiceDesign`, `DiceOptim`, `sensitivity`, `EngrExpt`, `lme4`.

Assessment: Exercises, that will include finding and assessing designs for practically relevant examples.

Notes

